BEFORE THE DIRECTOR
OF THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION FOR WATER TO WATER RIGHT NOS. 36-134B, 36-135A, and 36-15501 CM-DC-2014-004	**SPRONK WATER ENGINEERS, INC. EXPERT REPORT FOR 2014 RANGEN DELIVERY CALL PREPARED FOR THE CITY OF POCATELLO JANUARY 26, 2015**

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1.0 Introduction

On June 27, 2014, Rangen, Inc. ("Rangen") filed *Rangen, Inc.'s Petition for Delivery Call* ("2014 Rangen Call") with the Idaho Department of Water Resources ("IDWR") seeking a finding of injury to Rangen's 1884 (36-134B), 1908 (36-135A), and 1957 (36-15501) priority water rights as a result of junior-priority ground water pumping in the Eastern Snake Plain Aquifer ("ESPA"). As part of the petition, Rangen requested that the Director:

A. *Find that Rangen has suffered, and will suffer, material injury to Rangen' s 1884, 1908 and 1957 Water Rights as a result of junior-priority ground water pumping in the ESPA, including, but not limited to Water Districts 1, 34, 100, 110, 120,130 and 140 to the extent those Districts overlie the ESPA;*

B. *Administer and distribute water in the ESPA, including, but not limited to Water Districts 1, 34, 100, 110, 120, 130 and 140 to the extent those Districts overlie the doctrine. See I.C. § 42-607;*

C. *Order the water masters of the ESPA, including, but not limited to Water Districts 1, 34, 100, 110, 120, 130 and 140 to curtail junior-priority ground water pumping as necessary to deliver Rangen's water in accordance with the prior appropriation doctrine. See I.C. § 42-607;*

D. *Order immediate curtailment before any hearing is held because: (l) a determination of material injury has previously been made; (2) IGWA's defenses to Rangen's claim of material injury have been adjudicated; (3) immediate curtailment is necessary to secure an important government or public interest, towit, the guaranteed delivery of water rights obtained under the laws of the State of Idaho; (4) there is a need for prompt action in that junior diversions continue to prevent Rangen's ability to obtain all its decreed water flows; and (5) the State of Idaho, by and through its Department of Water Resources and Director, has a duty to supervise the allotment of both surface and ground water to those diverting water for any beneficial purpose; and*

E. *If the Department does not order immediate curtailment, then convene a timely hearing of this matter before further damage is done by junior-priority ground water pumping.*

On July 11, 2014, the City of Pocatello ("Pocatello") filed *City of Pocatello's Petition to be Designated a Respondent of Alternatively to Intervene*. The IDWR Director entered an order on July 23, 2014 designating Pocatello as a respondent.

On October 21, 2014, Rangen filed a *Notice of Withdrawal of Rangen, Inc.'s Petition for Delivery Call as to Water Rights Nos. 36-134B and 36-135A*. As a result, the 2014 Rangen Call is limited to Rangen's 1957 priority water right for diversion of 1.46 cubic feet per second ("cfs") from the Martin-Curren Tunnel ("Curren Tunnel") for year-around use for fish propagation.

The 2014 Rangen Call is the second delivery call filed by Rangen. The first delivery call was made on December 31, 2011 in *Rangen, Inc.'s Petition for Delivery Call* ("2011 Rangen Call"), in which Rangen sought a finding of injury to Rangen's 1962 (36-02551) and 1977 (36-07694) priority water rights as a result of junior-priority ground water pumping in the ESPA. In the 2011 Rangen Call, Rangen did not allege injury to its more senior water rights (36-134B, 36-135A, and 36-15501). A hearing on the 2011 Rangen Call was held in Boise from May 1, 2013 – May 16, 2013, and Pocatello participated in the hearing and presented evidence.

On January 29, 2014, IDWR Director, Gary Spackman, issued a *Final Order Regarding Rangen, Inc.'s Petition for Delivery Call; Curtailing Ground Water Right's Junior to July 13, 1962,* ("2014 Curtailment Order") ordering curtailment of ground water rights in the ESPA area of common ground water supply junior to July 13, 1962 and located west of a "trim line" generally coincident with a geologic feature known as the Great Rift. Curtailment of junior ground water rights west of the Great Rift would result in idling of approximately 157,000 irrigated acres. IDWR simulated curtailment of the 157,000 acres in the Eastern Snake Plain Aquifer Model, Version 2.1 ("ESPAM 2.1"). The ESPAM 2.1 simulation predicted a steady-state benefit of 14.4 cfs to the Rangen model cell, of which the Director determined that 63 percent would accrue to the Curren Tunnel (9.1 cfs) and the remainder (5.3 cfs) would accrue to the springs that emerge from the talus slope below the tunnel[1]. The Director ordered that curtailment could be avoided

[1] It was determined in the 2014 Curtailment Order that the total Curren Tunnel flow comprises of 63 percent of the total Rangen Hatchery flow (total Rangen model cell) flow based on a regression analysis between

by delivery of 9.1 cfs of mitigation water to the Curren Tunnel. Further, the Director allowed that delivery of mitigation water to the Curren Tunnel could be phased in over five years pursuant to the Conjunctive Management Rules (IDAPA 37.03.11 Rules 20.4 and 40.1a). The five-year phase-in of mitigation deliveries was determined through transient runs of ESPAM 2.1 resulting in the following annual mitigation requirements: 3.4 cfs in the first year; 5.2 cfs in the second year; 6.0 cfs in the third year; 6.6 cfs in the fourth year; and, 9.1 cfs in the fifth year. The first year began on April 1, 2014 and ends on March 31, 2015.

Rangen and Idaho Ground Water Appropriators, Inc. ("IGWA") filed petitions seeking judicial review of the Director's 2014 Curtailment Order. On October 24, 2014, Judge Wildman issued a *Memorandum of Decision and Order on Petitions for Judicial Review* ("2014 Wildman Order"). Judge Wildman concluded that "the Director erred by applying a trim line to reduce the zone of curtailment" and remanded the case back to IDWR for further proceedings to address this issue.

Figure 1-1 is a map of the Eastern Snake Plain Aquifer, and shows the locations of the Rangen Hatchery, Pocatello, and the Great Rift. Rangen's Aquaculture Research Center ("Rangen Hatchery") is located at the headwaters of Billingsley Creek approximately four miles southeast of Hagerman, Idaho and west of the Great Rift. Pocatello is not within the present curtailment area because it is located east of the Great Rift. However, for purposes of this report, it is assumed that the remand that was ordered by Judge Wildman could eventually result in expanding the scope of Director's curtailment order to include junior ground water rights east of the Great Rift. If curtailment were ordered east of the Great Rift, that portion of Pocatello's municipal water supply that is junior to Rangen's 1957 priority water right that is the subject of the 2014 delivery call would potentially be the subject of curtailment. This report was prepared to provide technical information relevant to the Rangen 2014 Call and to support Pocatello's response and defense against the delivery call.

In addition to Pocatello's interests, there are approximately 322,000 acres east of the Great Rift irrigated by ground water rights junior to July 13, 1962 that are potentially subject to an expanded curtailment order under the 2011 Rangen Call. Curtailment of pumping under these

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historical Curren Tunnel flows and corrected historical Rangen Hatchery flows.

ground water rights would result in an additional steady-state accrual to Rangen of 2.5 cfs, of which 1.5 cfs (2.5 cfs x 0.63) would accrue to the Curren Tunnel. Curtailment of ground water rights junior to July 13, 1962 across the entire ESPA area of common ground water supply would implicate 479,000 irrigated acres, and would produce a steady-state accrual of 16.9 cfs to the Rangen model cell, of which 10.6 cfs would accrue to the Curren Tunnel (16.9 cfs x 0.63). Judge Wildman affirmed that mitigation of the impacts of junior pumping on Rangen may be phased in over a five-year period.

Section 2 of the report provides a description of Rangen's facilities. **Section 3** describes Rangen and other Curren Tunnel water rights and the Curren Tunnel flow measurements. **Section 4** provides an evaluation of water supplies available to satisfy Rangen's 1957 priority water right. **Section 5** describes Pocatello's water rights and the potential effect on Rangen from curtailment of the City's junior pumping. **Section 6** lists the information that was relied on in preparing the report. Based on the Director's Order on November 3, 2014, which limited the issues to be resolved in the 2014 Rangen Call, we have relied on background information or supporting facts that were developed in the record for the 2011 Rangen Call, and assume additional substantiation is not required beyond reference here to the record in the prior case.

2.0 Rangen Hatchery

Rangen is primarily a producer and supplier of fish feed to fish hatcheries. The Rangen Hatchery was originally developed so that Rangen could conduct research to improve its fish feed. Commercial production of fish for sale to fish processors also became a function of the Rangen Hatchery. There has been little research performed at the Rangen Hatchery in recent years, and the hatchery is operated primarily to supply fish to the Idaho Power Company ("Idaho Power") for the fish stocking requirements that are part of its FERC licenses for hydropower production on the Snake River.

The Rangen Hatchery is located in the Hagerman Valley just below the rim of the Snake River canyon as shown in **Figure 2-1**. An aerial photograph of the Rangen facility is provided in **Figure 2-2**. The facility is comprised of a Hatch House and Greenhouse (aka Research Lab), which are indoor facilities; and three sets of outdoor raceways identified from upstream to downstream as the Small Raceways, the Large Raceways, and the CTR Raceways.

The fish rearing facilities are supplied water from a complex of springs known as the Curren Spring located immediately east of the hatchery. The Curren Spring is comprised of two components, (1) the Curren Tunnel located approximately 60 feet below the canyon rim, and (2) other springs that emerge at various locations from the talus slope below the Curren Tunnel. The Curren Spring is one of many spring complexes between Kimberly and the Malad River that are surface expressions of ground water flow from the ESPA.

A photograph of the Curren Tunnel diversion complex is shown in **Figure 2-3**. Rangen's domestic, irrigation, hatch house, and greenhouse water supplies are diverted through a 6-inch white PVC pipeline ("6-inch White Pipe") that originates inside of the Curren Tunnel as shown on the right side of **Figure 2-3**. Two larger white PVC pipes in the center of **Figure 2-3** emerge from a collection box and provide a portion of the water supply to the Rangen Hatchery. The two white pipes labeled "Rangen Box Pipelines" transmit water to a concrete control structure known as the "Rangen Box." Water from the Rangen Box can be routed through a 12-inch steel diameter pipe to the Small Raceways, or discharged to the talus slope where it can be collected

and diverted at the Bridge Diversion and delivered for use in the Large Raceways and CTR Raceways.

The Curren Tunnel was also originally the source for three irrigation pipelines not associated with the Rangen Hatchery. These pipelines, marked as "Irrigation Pipelines" in **Figure 2-3**, extend south from the collection box ("Farmer's Box") along the hillside to farms southwest of the Rangen Hatchery. In 2003, the Sandy Pipeline was constructed by IGWA to provide a substitute source of irrigation water to the other Curren Tunnel users for the purpose of mitigating impacts from pumping on the Curren Tunnel flow that was available to Rangen. Other than a small amount of domestic water that reportedly is still diverted through one of the irrigation pipelines, water from the Curren Tunnel is now used solely to supply the Rangen Hatchery.

A schematic diagram showing how water flows through the fish-rearing facilities is provided in **Figure 2-4**. There are two sources of "first use" water to the Rangen facility. Water from the Curren Tunnel is piped to the Hatch House, the Greenhouse, and the Small Raceways (collectively referred to as the "upper facilities"). The portion of the Curren Tunnel flow that is not sent to the upper facilities (i.e., the discharges to the hillside from the Rangen pipelines described above) plus the flow from the talus springs below the Curren Tunnel collects in a basin adjacent to the Hatch House and Greenhouse, and these flows are available for diversion at Rangen's lower diversion facility known as the "Bridge Diversion" for delivery to the Large Raceways. The outflow from the Small Raceways can be discharged to Billingsley Creek or reused by delivery to the Large Raceways. The outflow from the Large Raceways is the sole source of supply to the CTR Raceways.

3.0 Curren Tunnel Water Rights and Measurement

3.1 Rangen Curren Tunnel Water Rights

Rangen holds five water rights that supply water to the Rangen Hatchery as shown in **Table 3-1**. The decreed source for all five of Rangen's water rights is the Curren Tunnel. Rangen's two most senior water rights 36-134B and 36-135A are each decreed for less than 0.1 cfs for domestic and irrigation uses and have priority dates of October 9, 1884 and April 1, 1908, respectively. Rangen's water right 36-134B is decreed for 0.09 cfs for irrigation and domestic use in the irrigation season and 0.07 cfs for domestic uses during the non-irrigation season. Rangen's water right 36-135A is decreed for a total of 0.05 cfs for irrigation and domestic uses. Rangen's irrigation and domestic water rights total 0.14 cfs in the irrigation season and 0.12 cfs in the non-irrigation season. Rangen's domestic water rights are decreed for year-round use and the irrigation water rights are decreed for use during the irrigation season (February 15 – November 30).

Rangen holds three water rights that provide water to the Rangen Hatchery for fish propagation. The most senior of the three rights (36-15501) is decreed for 1.46 cfs with a priority date of July 1, 1957, and this water right is the subject of the 2014 Rangen Call. The other two water rights that supply the fish hatchery are 36-2551 for 48.54 cfs with a priority date of July 13, 1962, and 36-7694 for 26 cfs with a priority date of April 12, 1977. Rangen's fish propagation water rights are decreed for year-round use.

3.2 Other Curren Tunnel Water Rights

At the bottom of **Table 3-1** there is a summary of the senior water rights that formerly diverted irrigation water from the Curren Tunnel to supply the irrigation pipelines that extend to the south. The irrigation portion of these water rights are now supplied by water delivered through the North Side Canal via the Sandy Pipeline. A small amount of water continues to be delivered through the irrigation pipelines for domestic use. Descriptions of the other Curren Tunnel water rights are provided below.

Walter and Margaret Candy ("Candy") hold two Curren Tunnel water rights; 36-134A and 36-135B with priority dates of October 9, 1884 and April 1, 1908, respectively. Water Right No.

36-134A is decreed for 0.49 cfs for irrigation and domestic use in the irrigation season (February 15 – November 30) and 0.04 cfs for domestic use during the non-irrigation season. Water Right No. 36-135B is decreed for 0.51 cfs for irrigation use. The Candy water rights that are decreed for irrigation use are now supplied by the Sandy Pipeline, while the domestic water right for 0.04 cfs (36-134A) is still diverted from the Curren Tunnel.

The Alvin and Hope Musser Living Trust ("Musser") holds Water Right No. 36-102 with a priority date of April 1, 1892 for irrigation use (4.1 cfs), domestic use (0.04 cfs), and stock use (0.07 cfs). The Musser irrigation water right is supplied by the Sandy Pipeline. Musser reportedly still receives water from the Curren Tunnel for year around domestic uses, but currently does not divert tunnel water for stock uses.

Morris holds six Curren Tunnel water rights for irrigation and stock uses, including Water Right Nos. 36-134D, 36-134E, 36-135D, 36-10141A, and 36-10141B. These water rights provide a combined total maximum diversion entitlement of 6.05 cfs in the irrigation season and 0.20 cfs during the non-irrigation season. The Morris water rights have priority dates of October 9, 1884 (36-134D&E), April 1, 1908 (36-135D&E), and December 1, 1908 (36-10141A&B). IGWA and Morris have entered into an agreement in which IGWA is supplying Morris with water for irrigation from the Sandy Pipeline. In exchange, Morris is foregoing diversion of his six senior water rights from the Curren Tunnel. This foregone use is claimed by IGWA for mitigation of depletions to Rangen's Curren Tunnel water rights and is referred to as the "Morris Exchange Credit."

A summary of the monthly decreed diversion rates for all Curren Tunnel water rights senior to Rangen's 1957, 1962, and 1977 priority water rights that are the subject of the Rangen delivery calls is provided in **Table 3-2**. Because the irrigation season for the Curren Tunnel water rights begins on February 15, the monthly decreed rates for February were set equal to the average of the irrigation season and non-irrigation rates.

3.3 Curren Tunnel Measurements

The total flow of the Curren Tunnel is comprised of the water that discharges from the tunnel to the Farmers Box plus the water diverted from within the tunnel into the 6-inch White Pipe. Discharge from the Curren Tunnel to the Farmers Box has been measured by the IDWR since 1993. The 6-inch White Pipe lays on the bottom of the corrugated metal pipe that forms the tunnel and extends into the tunnel further than IDWR staff can easily walk into the tunnel to take flow measurements. Because of this, IDWR's flow measurements do not include the 6-inch White Pipe flows, which are estimated and reported to IDWR by Rangen.

3.3.1 IDWR Curren Tunnel Measurements

In 1993, IDWR installed continuous flow monitoring equipment in the Curren Tunnel consisting of a pressure transducer to assess the depth of flow and a data-logger to record the flow depth at 15 minute intervals. IDWR developed a rating curve to translate the depth of flow readings into discharge rates in cfs based on flow measurements made with a current meter by IDWR staff approximately every three months. While IDWR continues to measure the flow in the tunnel periodically, the rating curve that is currently in use was last updated in 2010 ("2010 rating curve").

IDWR provided data for the tunnel flow measurement and corresponding flows estimated using the 2010 rating curve to the parties to the 2014 Rangen Call. A summary of measured Curren Tunnel flows and the calculated flows using the 2010 rating is provided in the upper chart in **Figure 3-1** for the period from December 1993 to October 2014. The lower chart in **Figure 3-1** shows percent difference between the measured and calculated flows. The results in the lower chart indicate the percent variability between the measured and calculated flows increases at lower flows. When the Curren Tunnel flows are below 5 cfs, the percent difference in measured vs. calculated flows has a mean absolute error of approximately 16 percent with a maximum absolute error of 44 percent. When the Curren Tunnel flows are above 5 cfs, the percent difference in measured vs. calculated flows has a mean absolute error of approximately 7 percent with a maximum absolute error of 17 percent.

During a conference call with the parties to the 2014 Rangen Call on November 5, 2014, the IDWR staff described the difficulties in measuring the tunnel flow with a current meter. Among the difficulties were getting accurate flow measurements given the presence of 6-inch White Pipe in the bottom of the tunnel. The IDWR staff reported that the measurement difficulties may result in under-measurement of the Curren Tunnel flow. It is likely that these difficulties also contribute to the variability between the measured and computed flows shown in the lower chart in **Figure 3-1**, particularly at low flows.

The need for accuracy in the Rangen flow measurements is of utmost importance for administration of the Rangen delivery calls because the vast amount of curtailment that is necessary to accrue relatively small amounts of increased flow at the Curren Tunnel. Based on information contained in the 2014 Wildman Order, curtailment of pumping within the ESPA area of common ground water supply on 479,000 acres served by ground water rights junior to July 13, 1962 produces 10.6 cfs of increased Curren Tunnel flow at steady state. This means that it is necessary to curtail 45,200 acres of junior ground water irrigation to produce 1.0 cfs of increased flow at the Curren Tunnel. Based on the average Curren Tunnel flow of 3.0 cfs in 2014, a 10 percent measurement error (0.3 cfs) could result in a difference in curtailment of approximately 13,600 acres.

Because of the sensitivity of the required curtailment to shortages at the Curren Tunnel and the resulting need for accurate flow measurements, Rangen should be required to install the most accurate flow measuring device that can reasonably be accommodated within the Curren Tunnel. Potential options might include a sharp-crested contracted weir or a ramp flume. Ideally, the measuring device would be installed upstream of the inlet to the 6-inch White Pipe. Alternatively, the measuring device could be constructed around the 6-inch White Pipe.

IDWR has provided daily average Curren Tunnel flow data from September 8, 1993 – January 6, 2015. The monthly average IDWR Curren Tunnel flow data from September 1993 – December 2014 are shown in **Table 3-3**.

During the period of record for the Curren Tunnel flow data, IDWR has reported the following issues with the pressure transducer that is used to measure the depth of flow in the tunnel:

- In 2008, the transducer was shifted towards the mouth of the tunnel resulting in a shift in the water level measurements. The transducer was moved back into place and the data were adjusted to account for the shift. The period of record affected by this issue was not disclosed by IDWR.

- In 2011, rodents chewed through the transducer cable causing the metal conduit to rust. A new transducer was installed in December 2011. The period of record affected by this issue was not disclosed by IDWR.

- On October 16, 2013 the pressure transducer electronically failed. A new transducer was installed on March 5, 2014.

During times of faulty or missing transducer data, IDWR estimated the Curren Tunnel flows based on an adjustment applied to the measured flows at Box Canyon Springs. The details of the adjustment and the periods that it was applied were not disclosed by IDWR, and therefore the reasonableness of this approach for estimating the Curren Tunnel flow when the transducer was inoperable has not been evaluated. In any event, indirect estimates of Curren Tunnel flows through comparison to the flows of Box Canyon Spring or any other spring are not reasonable for administering and enforcing the delivery calls made by Rangen. As described above, accurate Curren Tunnel flow measurements are essential.

3.3.2 6-inch White Pipe Flows

Rangen estimates the flows from the 6-inch White Pipe in the hatch house at weekly intervals and reports the data to IDWR. IDWR estimates daily flows for the 6-inch White Pipe using linear interpolation between the weekly flow estimates reported by Rangen.

A December 15, 2006 memorandum from Cindy Yenter, IDWR Watermaster for Water District 130, described the procedures used by Rangen to estimate the flow from the 6-inch White Pipe. Yenter reported that the 6-inch White Pipe has no measuring device, and that flows are estimated based on the number of tanks in use multiplied by assumed flow rates for each tank, plus an assumed flow rate for irrigation and domestic water uses.

More than a decade ago, IDWR staff conducted measurements of the 6-inch White Pipe and found that the estimated (assumed) pipe flow was 18 percent higher than measured in July 2001 and 9 percent lower than measured in March 2002. Based on the findings in the 2006 Yenter memorandum, there appears to be variability in Rangen's 6-inch PVC white pipe measurements that is not reflected in the assumed tank flows and the irrigation and domestic uses that are the basis of the flows reported by Rangen. The variation in Rangen's 6-inch PVC white pipe flow estimates coupled by the interpolation of flows between the weekly measurements, as described above, raises concerns that require further review

As a part of its water administration duties, IDWR has developed *Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices* (IDWR, 2013) and a *List of Approved Closed Conduit Flow Meters* (IDWR, undated) (together, "Measurement Guidelines"). The procedures used by Rangen to estimate the flow in the 6-inch White Pipe do not conform to the Measurement Guidelines. Rangen should be required to install a standard flow measurement device with a continuous recorder that conforms to the Measurement Guidelines. These continuous flow measurements should be compiled into daily average flows for reporting to IDWR. Rangen should further be required to verify that the 6-inch White Pipe measurements are accurate due to the need for accurate Curren Tunnel flow measurements as described above.

Interpolated daily flow data for the 6-inch White Pipe flow data are available on the IDWR website from 1996 – 2013. Weekly flow estimates for 2014 were provided by Rangen on January 23, 2015, and these data are summarized in **Figure 3-2**. The 2014 weekly flow estimates were converted into daily flow estimates using IDWR's linear interpolation procedure. The monthly average reported 6-inch White Pipe flows from 1996 – 2014 are shown in **Table 3-4.**

3.3.3 Total Curren Tunnel Flow

As described above, the total flow of the Curren Tunnel is determined as the sum of IDWR's Curren Tunnel flow data and Rangen's estimates of the flow from the 6-inch White Pipe. Monthly average total Curren Tunnel flows from 1996 – 2014 are shown in **Table 3-5**. The

flows during the 1996 – 2014 averaged 7.2 cfs and ranged from 0.9 cfs to 24.1 cfs. The total Curren Tunnel flows in 2014 averaged 3.0 cfs and ranged from 1.0 cfs to 6.4 cfs.

4.0 Analysis of Water Available to Rangen's 1957 Priority Water Right

In the petition for the 2014 Rangen Call, Rangen alleged that there is insufficient water to satisfy its 1957 priority water right for 1.46 cfs based on the Curren Tunnel flow of 1.33 cfs that existed on June 9, 2014. The petition included a table that allocated the 1.33 cfs proportionally to the five Curren Tunnel water rights with an October 9, 1884 priority date (Morris [36-134D and 36-134E], Candy [36-134E], Rangen [36-134B], and Musser [36-102]) without consideration of whether these water rights were actually in use. Based on this faulty analysis, Rangen asserted that there was no water available to its 1957 priority water right. In addition, Rangen has not provided evidence of beneficial use of the 1957 water right.

The analysis presented in the Rangen petition is insufficient to evaluate the merits of the delivery call because it does not consider the Curren Tunnel water that is actually being used by senior water rights and does not consider the seasonal variability in the tunnel flows. To assist in evaluating the 2014 Rangen Call, an analysis of the supply available to Rangen's 1957 priority water right was performed using available flow data, and considering other senior water rights that are supplied from the tunnel. In addition, the analysis also includes evaluation of the benefit to Rangen from various mitigation activities.

Judge Wildman's December 3, 2014 Memorandum of Decision and Order on Petition for Judicial Review related to one of IGWA's mitigation plans for the 2011 Rangen Call found that mitigation activities should not be evaluated on the basis of annual average flows. To be consistent with this ruling, and considering the seasonal variability in the Curren Tunnel flows, the analyses described herein were performed using monthly average flow data throughout the calendar year rather than on the basis of annual average flows as had been the case in the 2011 Rangen Call.

The flow analyses involved allocation of the available monthly average Curren Tunnel flows in order of priority to the water rights that are actually in use. This process includes allocation to the relatively small non-Rangen uses, IGWA's Morris Exchange Credit, and the various Rangen priorities.

4.1 Senior Water Rights Currently Diverting from the Curren Tunnel

As described in **Section 3.2**, the senior water rights that are currently diverted at the Curren Tunnel are Candy's domestic water right for 36-134A (0.04 cfs) and Rangen's water rights 36-134B and 36-135A for 0.14 cfs in the irrigation season and 0.12 cfs in the non-irrigation season. The senior water rights that currently divert from the Curren Tunnel total 0.18 cfs (0.04 cfs + 0.14 cfs) during the irrigation season and 0.16 cfs (0.04 cfs + 0.12 cfs) during the non-irrigation season.

4.2 Monthly Water Available to Rangen's 1957 Priority Water Right

Monthly average Curren Tunnel flows available to Rangen's 1957 priority water right in 2014 are summarized in **Table 4-1**. The monthly average Curren Tunnel flows are first allocated to the senior water rights that currently divert from the Curren Tunnel as described in **Section 4.1**. Next, water is allocated to the Morris Exchange Credit, which is subsequently applied to mitigate Rangen's 1957 priority water right. Any remaining Morris Exchange Credit after application to the 1957 priority water right is allocated to Rangen's 1962 priority water right.

The following is a column-by-column description of the flow allocation analysis contained in **Table 4-1.**

- Column 1 is the monthly average Curren Tunnel flows and is equal to the 2014 IDWR measurements plus the 2014 reported 6-inch White Pipe flows.
- Column 2 shows the total senior water rights that are currently diverted from the Curren Tunnel.
- Column 3 is the remaining Curren Tunnel flows after allocation to the senior water rights actually in use (col [1] – col [2]). The remaining flow ranges from 0.76 cfs in July to 6.21 cfs in October, and averages 2.81 cfs.
- Column 4 shows the combined total flow decreed to the Morris irrigation water right during the February 15 – November 30 irrigation season. The flow rate for February was set at one-half of the combined decreed rate because the decreed irrigation season only includes approximately one half of the month.
- Column 5 shows allocation of the remaining Curren Tunnel flow from column 3 to the Morris Exchange Credit. The monthly Morris Exchange Credit ranges from 0.76 cfs in July to 6.05 cfs in October, and averages 2.23 cfs.
- Columns 6 – 10 show the allocation of water to Rangen's 1957 priority water right.

- Column 6 is the decreed rate for the 1957 priority water right – 1.46 cfs year-round.
- Column 7 shows the allocation of the Morris Exchange Credit from column 5 to Rangen's 1957 priority water right.
- Column 8 is the Curren Tunnel flow available to Rangen's 1957 priority water right during the non-irrigation season when the Morris Exchange Credit is not available.
- Column 9 is the total flow available to the 1957 priority water right (column 7 + column 8).
- Column 10 shows the monthly shortages to Rangen's 1957 priority water right. The shortages occur in May (0.22 cfs), June (0.25 cfs), and July (0.70 cfs).

- Column 11 shows the remaining Morris Exchange Credit after allocation to the 1957 priority water right that is available for mitigation of shortages to Rangen's 1962 priority water right.

In summary, the analysis presented in **Table 4-1** shows that in all but three months, the available Curren Tunnel flows are sufficient to satisfy Rangen's 1957 priority water right. Shortages to the 1957 priority water right were computed in May (0.22 cfs), June (0.25 cfs), and July (0.70 cfs). However, given the measurement issues described above, the accuracy of these shortage estimates is uncertain.

4.3 Total Estimated Mitigation Requirement and Mitigation Supplies to Rangen

Several mitigation plans have been filed to mitigate impacts to Rangen's 1962 priority water right as a result of the 2011 Rangen Call. These mitigation plans propose to supply water at the Curren Tunnel. Based on the prior appropriation doctrine, it is appropriate to apply mitigation water in order of priority to the Rangen water rights, first to the 1957 priority water right, and then to the 1962 priority water right. The following is a summary of the allocation of additional mitigation supplies that are being developed by IGWA to mitigate impacts from irrigation pumping to Rangen.

4.3.1 Total Estimated Mitigation Requirement in 2015

The mitigation requirement to Rangen in 2015 was estimated based on the estimated 2014 shortage to Rangen's 1957 priority water right from **Table 4-1** plus the estimated 2015 mitigation requirement for Rangen 1962 priority water right.

In accordance with the 2014 Wildman Order remanding the prior application of the Great Rift trim line issue, the transient or phased-in mitigation requirement to Rangen's 1962 priority water right in 2015 for the ESPA area of common ground water west of the Great Rift has been increased to account for impact to Rangen from curtailment in the area east of the Great Rift. The amount of the increase was estimated by application of a scaling factor to the results from the transient curtailment runs for the area west of the Great Rift. A scaling factor of 1.17 was computed based on the modeled steady-state benefit to the Rangen cell from curtailment of the entire ESPA area of common ground water supply divided by the modeled steady-state benefit to the Rangen cell from curtailment of the area west of the Great Rift (16.9 cfs/14.4 cfs = 1.17)[2].

The mitigation requirement to Rangen's 1962 priority water right for the first part of 2015 (April 2014 – March 2015) was estimated as the predicted year one accrual for curtailment of the ESPA area of common ground water west of the Great Rift (3.4 cfs) multiplied by the 1.17 scaling factor (3.4 cfs x 1.17 = 3.99 cfs). The mitigation requirement to Rangen's 1962 priority water right for the remainder of 2015 (April 2015 – December 2015) was estimated as the predicted year two accrual for curtailment of the ESPA area of common ground water west of the Great Rift (5.2 cfs) multiplied by the 1.17 scaling factor (5.2 cfs x 1.17 = 6.10 cfs).

The total estimated additional mitigation requirement to Rangen in 2015 was computed as the estimated remaining shortage to Rangen's 1957 water right plus the estimated mitigation requirement to Rangen's 1962 priority water right. The resulting estimated remaining 2015 mitigation requirement is shown in column (3) of **Table 4-2** and ranges from 3.99 cfs to 6.80 cfs and averages 5.67 cfs.

4.3.2 Additional Water Supply to the Curren Tunnel

IGWA has filed applications for the several mitigation plans in response to the 2014 Curtailment Order and these plans propose the following sources of mitigation supply:

- Morris Exchange Credit,

[2] Use of a scaling factor was necessary because IDWR has not provided transient curtailment runs for curtailment of pumping junior to July 13, 1962 across the entire ESPA.

- Delivery of water through the Magic Springs Pipeline to the Rangen Hatchery ("Magic Springs Project"),
- Delivery water permitted by IGWA from the Bridge Diversion pumped up to the Curren Tunnel for use by Rangen,
- Delivery of Tucker Springs water via a pipeline to the Rangen Hatchery,
- Credit for current and ongoing aquifer enhancement activities, and
- Credit for aquifer recharge at the Sandy Ponds.

IGWA's aquifer enhancement activities, Magic Springs Project, and Morris Exchange Credit mitigation plans have been conditionally approved. IGWA's Bridge Diversion mitigation plan is pending. In addition, A&B irrigation District and the Coalition of Cities have mitigation plans that have been conditionally approved for aquifer enhancement and recharge to supply additional water to the Curren Tunnel.

The monthly Morris Exchange Credit that is available for mitigation to Rangen's 1962 priority water right is shown in column (4) of **Table 4-2**, and ranges from 0.00 cfs to 4.56 cfs.

On November 6, 2014, IDWR issued an order accepting IGWA's Magic Springs Project mitigation plan. Under the Magic Springs Project, IGWA is constructing the Magic Springs Pipeline that reportedly will be capable of delivering 10 cfs of leased water to the Curren Tunnel. The Magic Springs Project reportedly will begin delivering water in February 2015. As shown in column (7) of **Table 4-2**, after deliveries from the Magic Springs Pipeline commence, the potential deliveries are more than sufficient to mitigate the shortages to the Rangen's 1957 priority water right during May – July and all of estimated mitigation requirements for Rangen's 1962 priority water right.

On November 18, 2014, IDWR granted a permit to IGWA for a 12 cfs water right for mitigation at the Bridge Diversion near the head of Billingsley Creek that is supplied by the talus slope flows. IGWA proposes divert water for mitigation at two points of diversion. One point of diversion is a proposed pump station that will pump water for delivery and use in Rangen's upper facilities, and the other point of diversion will utilize Rangen's existing Bridge Diversion structure for delivery of water to the Large Raceways and CTR Raceways. The November 18,

2014 Order requires IGWA to complete certain actions before using its Bridge Diversion water right for mitigation, including an eminent domain action to gain a legal right of access to the subject property, and installation of measuring device(s) to quantify the Bridge Diversion mitigation credit.

If and when IGWA complies with the requirements set forth in the November 18, 2014 Order, additional mitigation water for the Rangen delivery calls will become available. The monthly amount of water that will be available from this supply was estimated based on the most recent records of Rangen's Bridge Diversions from 2014[3] as shown in column (9) of **Table 4-2**.

Further, there are additional mitigation sources that may provide additional water to the Rangen that are not included in the analyses shown in **Tables 4-1 and 4-2**, including IGWA's aquifer enhancement activities, the Coalition of Cities recharge plan, and A&B Irrigation District ongoing aquifer enhancement activities.

The foregoing analysis provides a reasonable and reliable method for priority allocation of the Curren Tunnel flows and for calculating the adequacy of mitigation credit available to Rangen. Assuming the Curren Tunnel flows in 2015 will be similar to the flows in 2014, Rangen's 1957 water right is not presently short of water. If the Magic Springs Pipeline begins delivering water in the near future as projected, then the estimated shortages to the 1957 water right that were experienced in May – July, 2014 will not occur in 2015.

[3] Monthly average Bridge Diversions were computed as the Total Rangen Hatchery flows in 2014 less the total Curren Tunnel flows in 2014.

5.0 Description of Interests of the City of Pocatello

Pocatello operates a municipal water system serving a population of approximately 50,000 residents in southeastern Idaho. The City's primary water service area lies along Portneuf River valley floor and the surrounding foothills, and is supplied water from numerous wells in the Lower Portneuf River Valley Aquifer ("LPRVA") and two wells in the ESPA. These wells are collectively referred to as the "City Wells." The LPRVA is an alluvial aquifer that underlies the Portneuf River and extends from the Portneuf Gap south of the City to the intersection with the ESPA north of the City. The City Wells that deliver water for culinary uses are interconnected and have been partially decreed in the SRBA as alternate points of diversion for each other.

Another Pocatello water service area is located in and around the Pocatello Airport. Wells in the ESPA supply culinary water to the airport and associated development, and water for irrigation of fields around the airport that are used for land application of biosolids from the City's wastewater treatment plant pursuant to an NPDES permit. These wells are collectively referred to as the "Airport Wells."

A map showing the location of the City Wells and Airport Wells is provided as **Figure 5-1**. In addition to its ground water wells, Pocatello also has several sources of surface water. These include surface water rights on Mink Creek and Gibson Jack Creek, which are tributaries of the Portneuf River southwest of the City. These surface water rights served as the original water supply for the City. The City also has a contract with the Bureau of Reclamation ("Reclamation") for 50,000 acre-feet in Palisades Reservoir. A tabulation of Pocatello's water rights is provided in **Table 5-1**.

Rangen has requested curtailment of all ground water rights with priorities junior to July 1, 1957. Pocatello has ground water priorities junior to Rangen's 1957 priority water right totaling 24.6 cfs in the ESPA and 50.7 cfs in the LPRVA, and curtailment of the junior Pocatello ground water rights would potentially impact the City's water supply, depending on the amount of the junior water rights that Pocatello is using.

The average transient response to Rangen from the pumping of Pocatello's ESPA wells was presented in charts presented as evidence in the hearing for the 2011 Rangen Call. These charts were updated to reflect the circumstances of the 2014 Rangen Call and are shown in **Figures 5-2 and 5-3**. The average transient responses for Pocatello's ESPA wells, expressed as a percentage of pumping, are shown in **Figure 5-2**. The solid line in **Figure 5-2** represents the simulated impact to the entire Rangen Spring complex, and the dashed line represents the impact to the Curren Tunnel (63% of the impact to the Curren Spring complex).

The transient benefits to Rangen from curtailment of Pocatello's ESPA wells with priority dates junior to Rangen's 1957 priority water right are shown in **Figure 5-3**. The solid line shows the benefit to the Rangen Spring complex, and the dashed line shows the benefit to the Curren Tunnel (63% of the impact to the Curren Spring complex). The results in **Figure 5-3** show that the benefit to the Curren Tunnel from curtailment of Pocatello's ESPA water rights with priority dates junior to Rangen's 1957 priority water right would be minimal, even at steady state (approximately 0.015 cfs, or about 7 gallons per minute).

6.0 References

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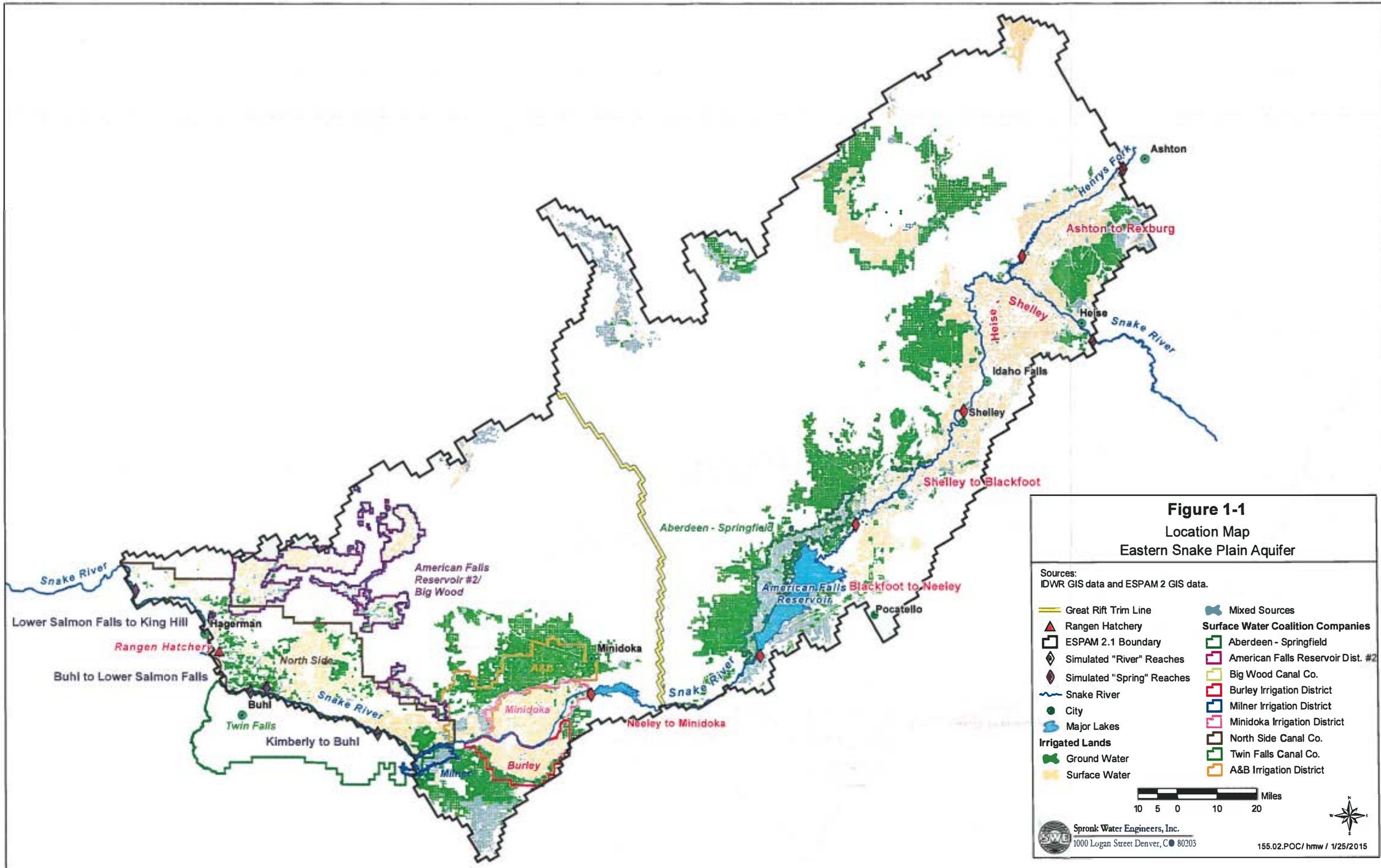
Ashton
Henrys Fork
Ashton to Rexburg
Heise
Shelley
Heise - Shelley
Snake River
Idaho Falls
Shelley
Shelley to Blackfoot
Aberdeen - Springfield
American Falls Reservoir #2/ Big Wood
American Falls Reservoir
Blackfoot to Neeley
Pocatello
Snake River
Lower Salmon Falls to King Hill
Hagerman
Rangen Hatchery
Buhl to Lower Salmon Falls
North Side
Buhl
Twin Falls
Snake River
Kimberly to Buhl
Minidoka
A&B
Minidoka
Neeley to Minidoka
Snake River
Burley
Milner
Figure 1-1
Location Map
Eastern Snake Plain Aquifer
Sources:
IDWR GIS data and ESPAM 2 GIS data.
Great Rift Trim Line
Rangen Hatchery
ESPAM 2.1 Boundary
Simulated "River" Reaches
Simulated "Spring" Reaches
Snake River
City
Major Lakes
Irrigated Lands
Ground Water
Surface Water
Mixed Sources
Surface Water Coalition Companies
Aberdeen - Springfield
American Falls Reservoir Dist. #2
Big Wood Canal Co.
Burley Irrigation District
Milner Irrigation District
Minidoka Irrigation District
North Side Canal Co.
Twin Falls Canal Co.
A&B Irrigation District
Miles
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N
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Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203
155.02.POC/ hmw / 1/25/2015

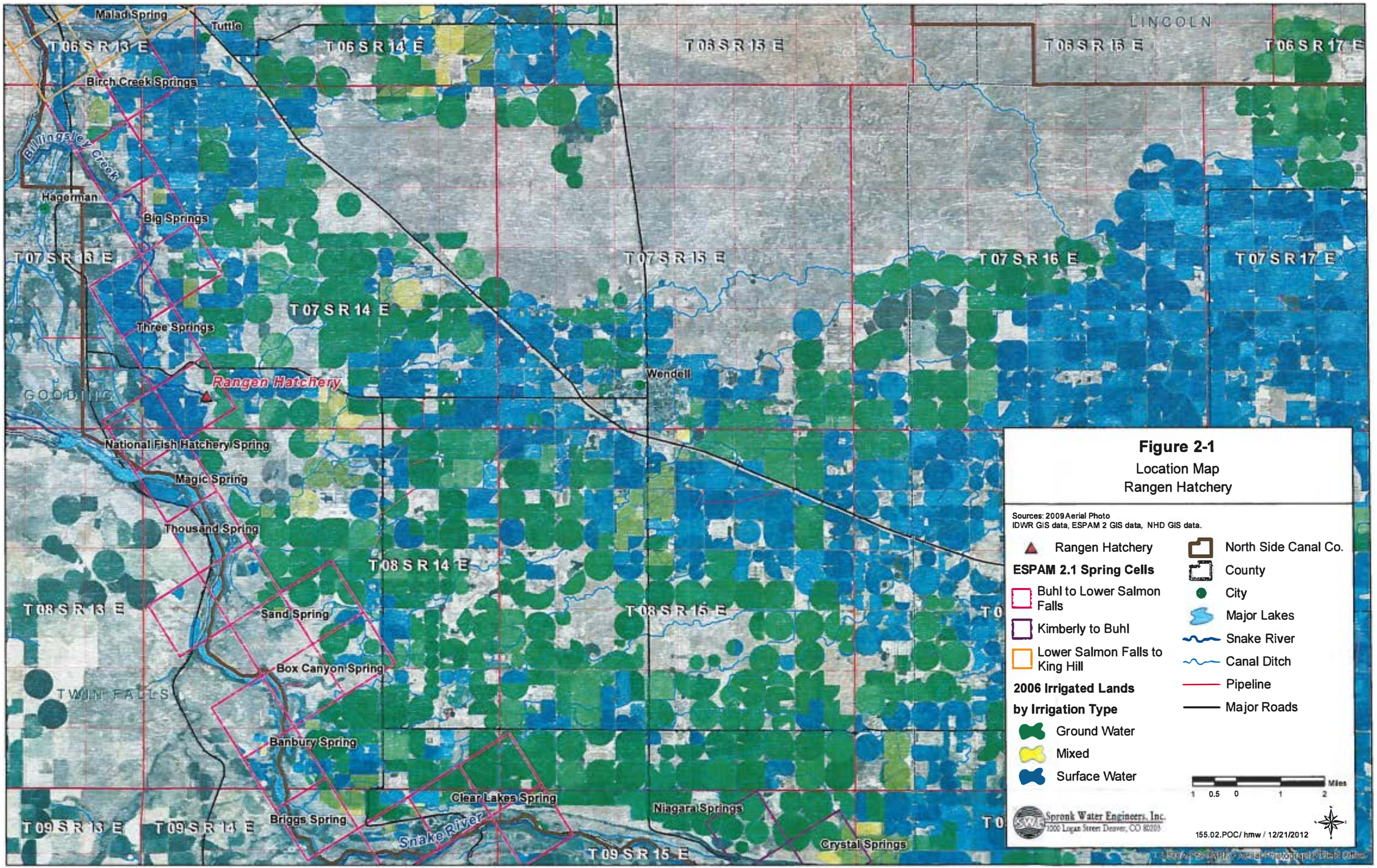

Malad Spring
Tuttle
T06S R13E
T06S R14E
T06S R15E
LINCOLN
T06S R16E
T06S R17E
Birch Creek Springs
Billingsley Creek
Hagerman
Big Springs
T07S R13E
T07S R15E
T07S R16E
T07S R17E
T07S R14E
Three Springs
Rangen Hatchery
Wendell
GOODING
National Fish Hatchery Spring
Magic Spring
Thousand Spring
T08S R14E
T08S R13E
T08S R15E
Sand Spring
Box Canyon Spring
TWIN FALLS
Banbury Spring
Clear Lakes Spring
Niagara Springs
T09S R13E
T09S R14E
Briggs Spring
Snake River
T09S R15E
Crystal Springs
Figure 2-1
Location Map
Rangen Hatchery
Sources: 2009 Aerial Photo
IDWR GIS data, ESPAM 2 GIS data, NHD GIS data.
Rangen Hatchery
ESPAM 2.1 Spring Cells
Buhl to Lower Salmon Falls
Kimberly to Buhl
Lower Salmon Falls to King Hill
2006 Irrigated Lands
by Irrigation Type
Ground Water
Mixed
Surface Water
North Side Canal Co.
County
City
Major Lakes
Snake River
Canal Ditch
Pipeline
Major Roads
Miles
1 0.5 0 1 2
Spronk Water Engineers, Inc.
2000 Logan Street Denver, CO 80205
155.02.POC/ hmw / 12/21/2012

Figure 2-2

Aerial Photograph
Rangen Hatchery

Source: 2011 USDA NAIP Aerial Photo (June 27).

200 100 0 200 400 Feet

Sprouk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203

155.02.POC/ hmw / 12/21/2012

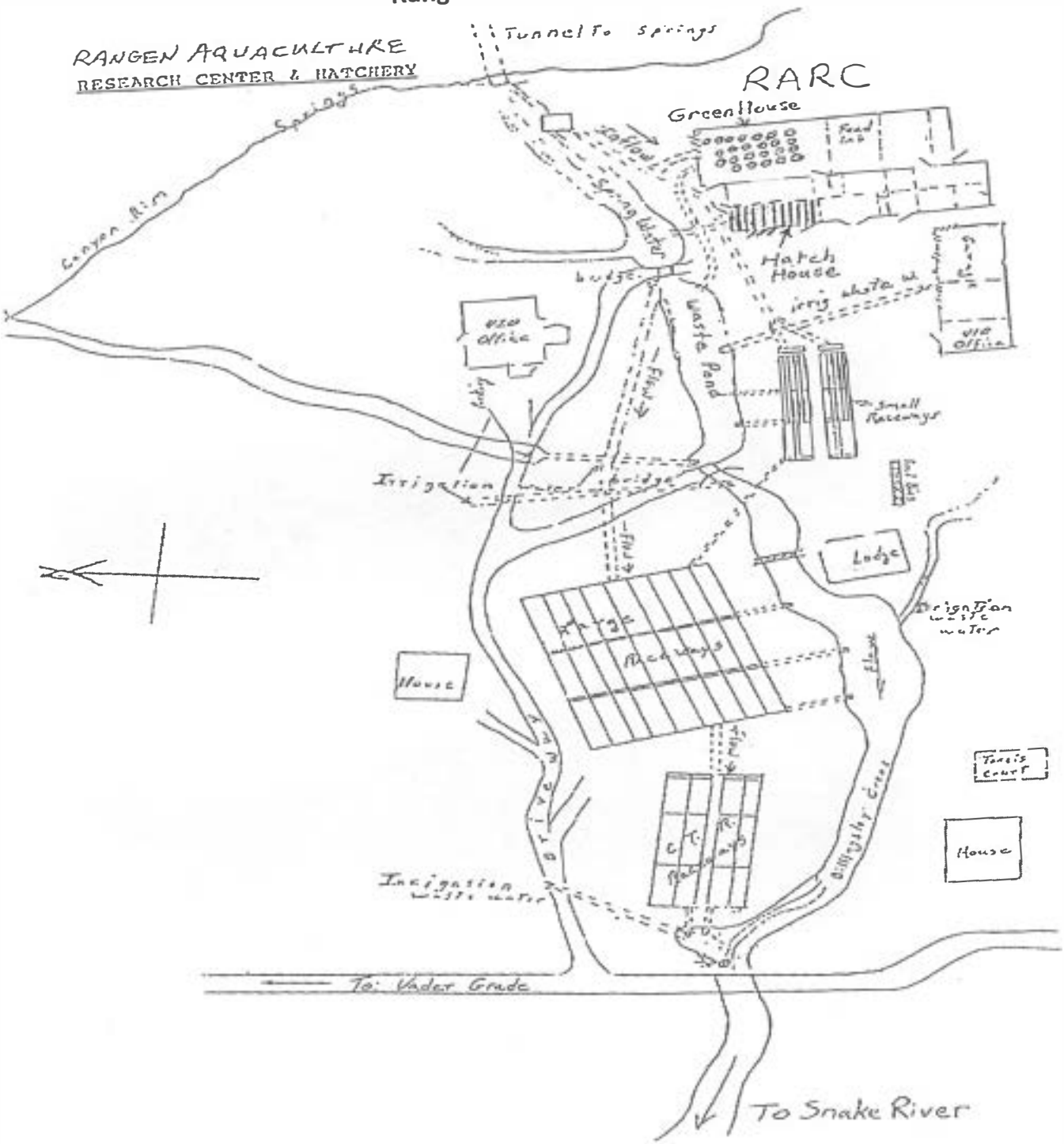
Figure 2-3

Photograph of Curren Tunnel Diversion Facilities

Photo taken on June 19, 2012.

Figure 2-4

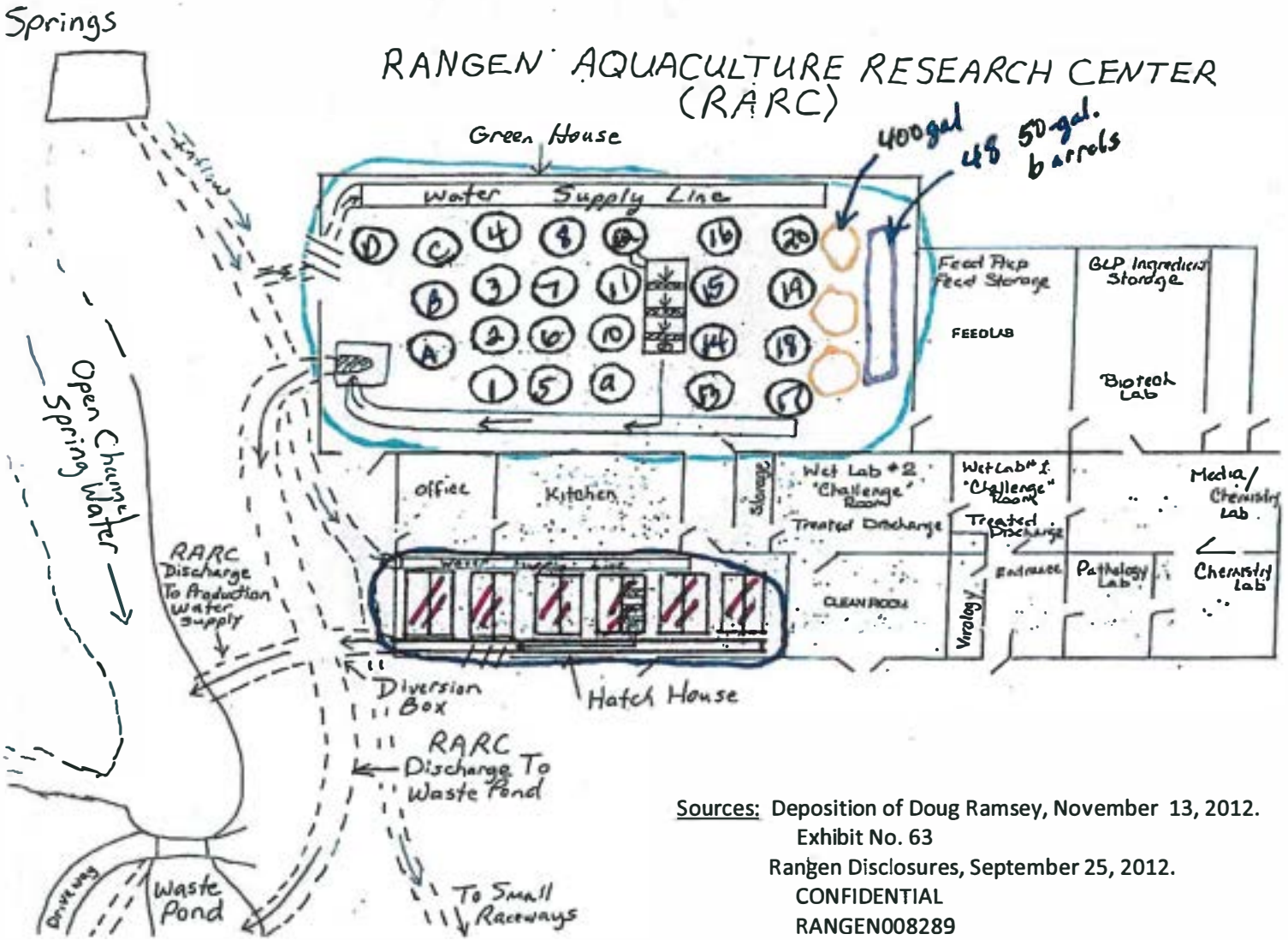
Schematic Diagram
Rangen Hatchery



Source: Rangen Disclosures, September 25, 2012.
CONFIDENTIAL
RANGEN008288

Figure 2-4

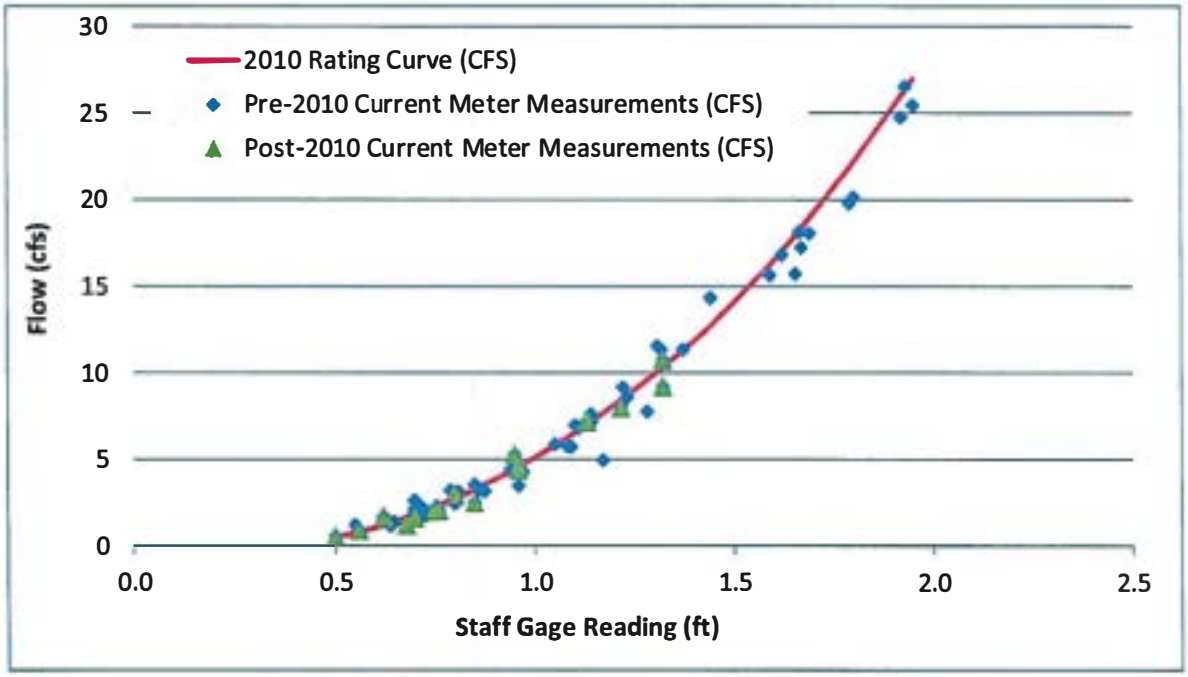
Schematic Diagram
Rangen Hatchery

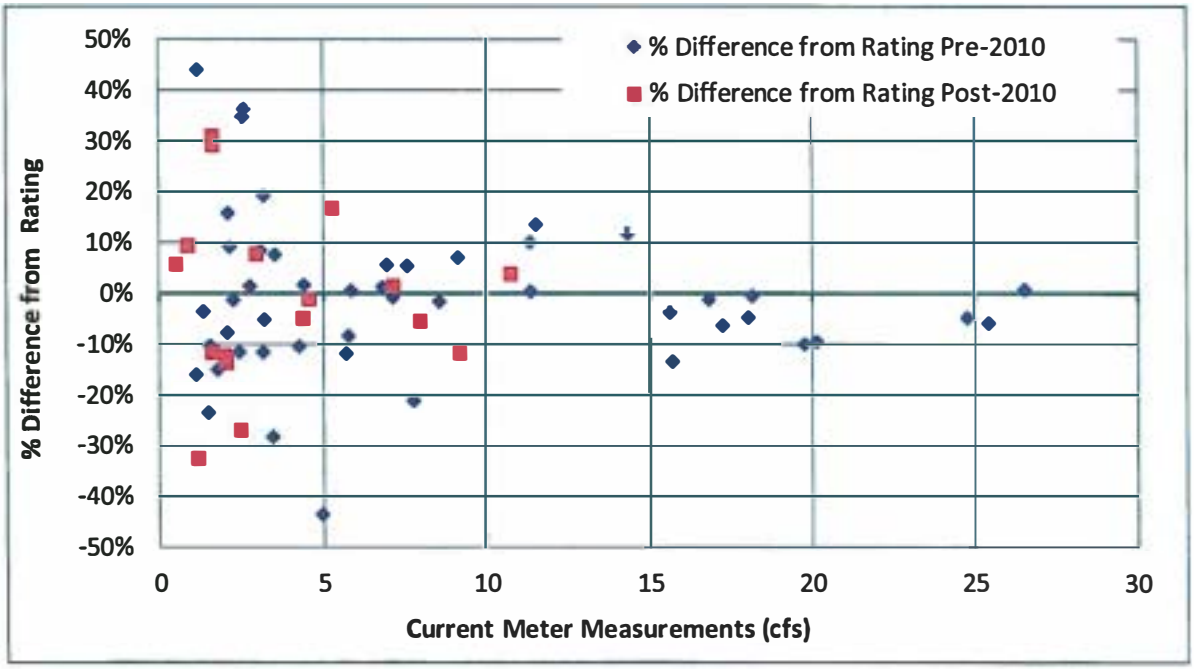


Sources: Deposition of Doug Ramsey, November 13, 2012.
Exhibit No. 63
Rangen Disclosures, September 25, 2012.
CONFIDENTIAL
RANGEN008289

Figure 3-1

Measured vs. Calculated Curren Tunnel Flow Measurements
December 29, 1993 - October 24, 2014

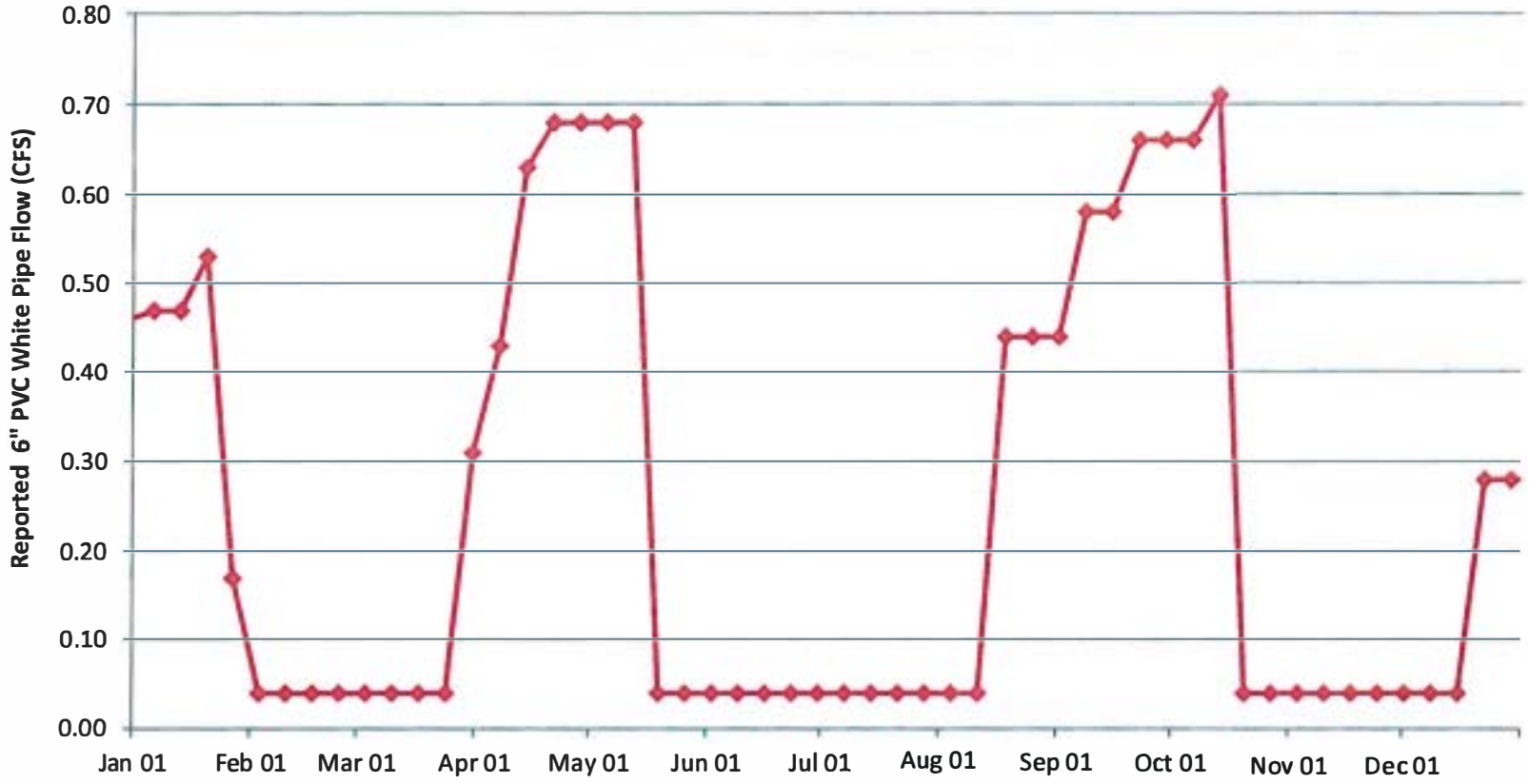




Data provided by Michelle Richman, IDWR on November 5, 2014.

Figure 3-2

6-Inch White Pipe Records
Rangen 2014 Report
Reported Weekly Flows
(CFS)



Note:
Weekly measurements provided by Rangen on January 23, 2015. Daily flows are estimated using a linear interpolation between the weekly measurements.

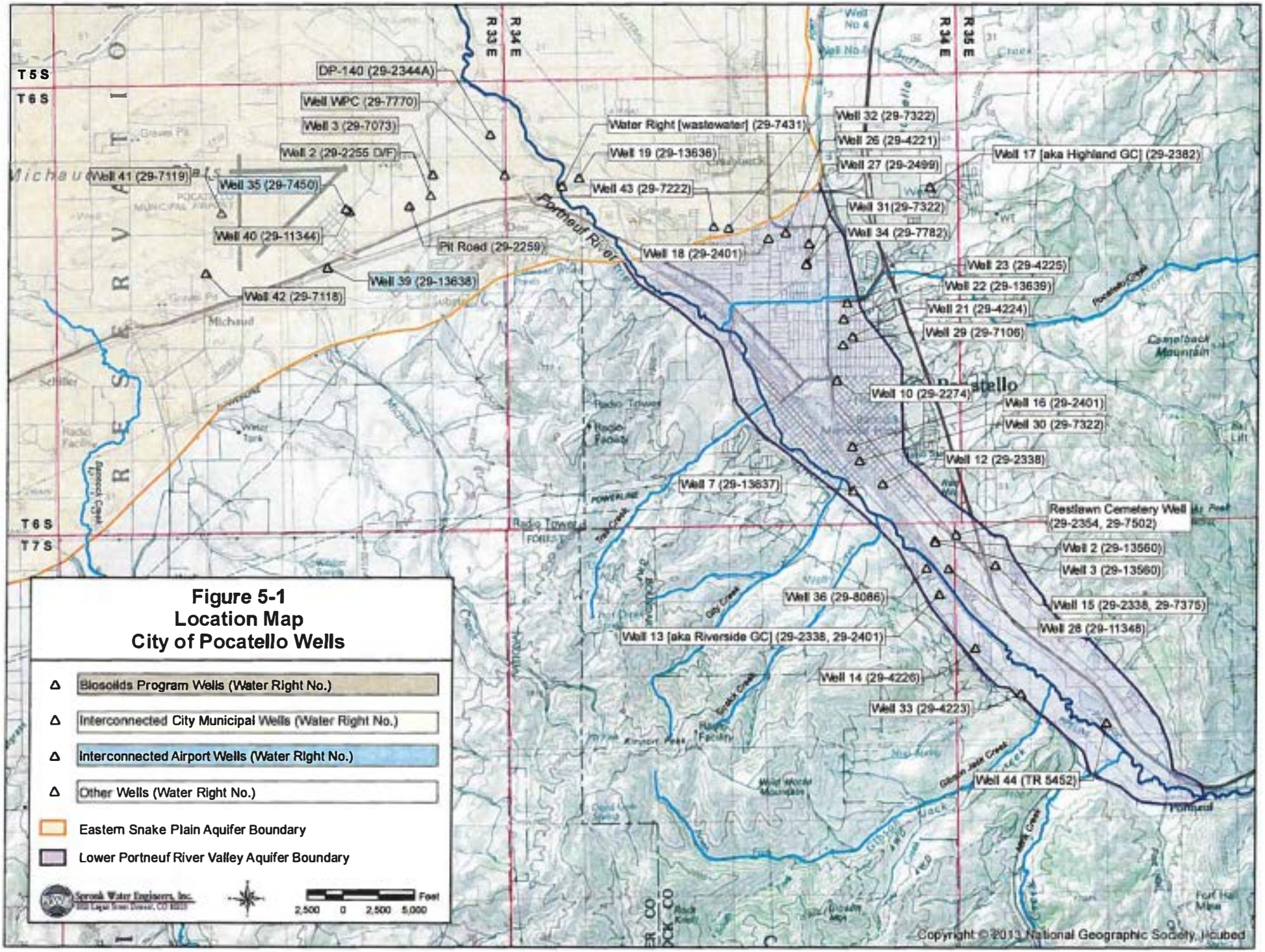
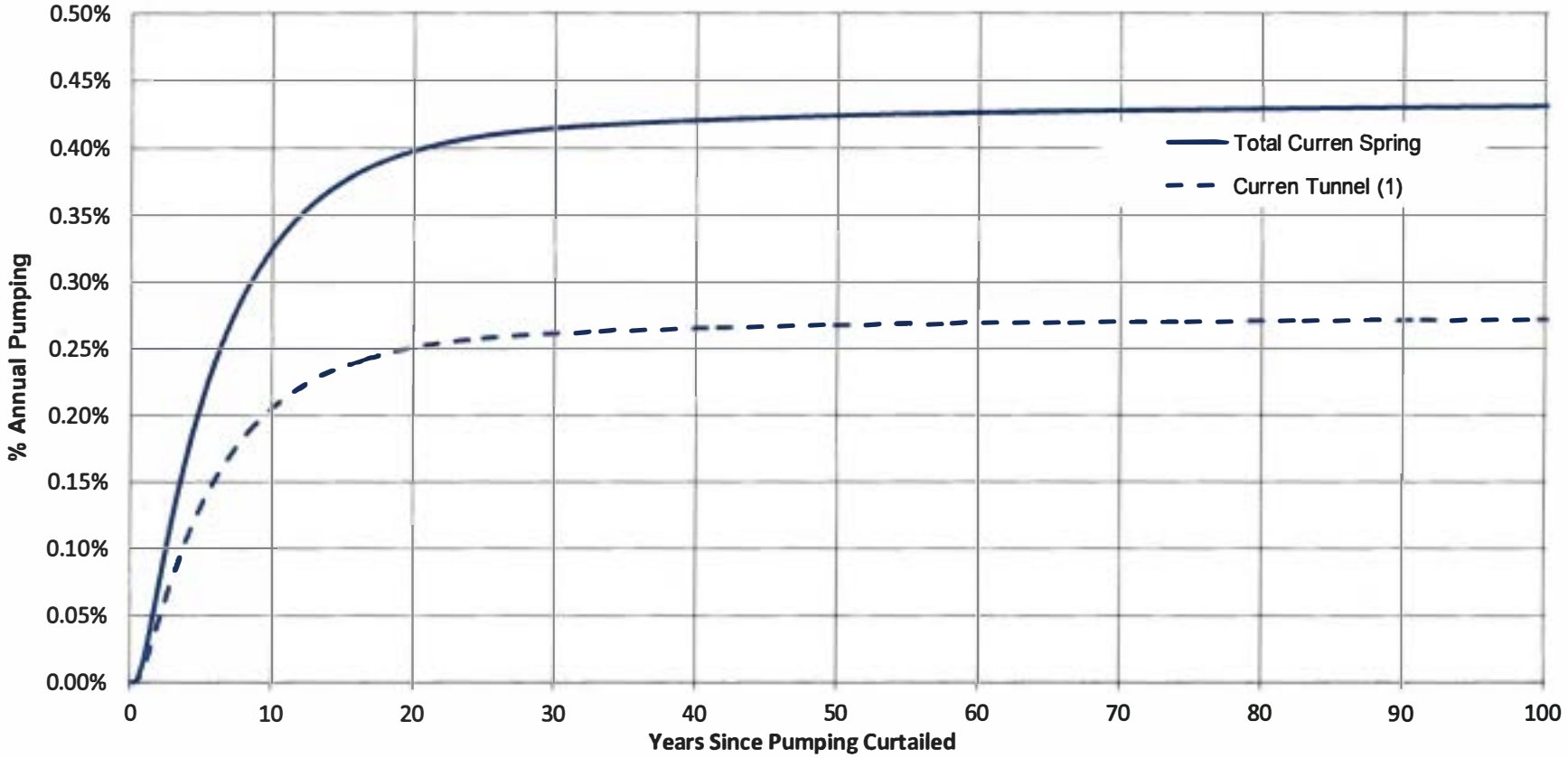

T5S
T6S
T7S
R33E
R34E
R35E
DP-140 (29-2344A)
Well WPC (29-7770)
Well 3 (29-7073)
Well 2 (29-2255 D/F)
Well 41 (29-7119)
Well 35 (29-7450)
Well 40 (29-11344)
Pit Road (29-2259)
Well 39 (29-13638)
Well 42 (29-7118)
Water Right [wastewater] (29-7431)
Well 19 (29-13636)
Well 43 (29-7222)
Well 18 (29-2401)
Well 32 (29-7322)
Well 26 (29-4221)
Well 27 (29-2499)
Well 31(29-7322)
Well 34 (29-7782)
Well 17 [aka Highland GC] (29-2382)
Well 23 (29-4225)
Well 22 (29-13639)
Well 21 (29-4224)
Well 29 (29-7106)
Well 10 (29-2274)
Well 16 (29-2401)
Well 30 (29-7322)
Well 12 (29-2338)
Well 7 (29-13637)
Restlawn Cemetery Well (29-2354, 29-7502)
Well 2 (29-13560)
Well 3 (29-13560)
Well 36 (29-8086)
Well 15 (29-2338, 29-7375)
Well 28 (29-11348)
Well 13 [aka Riverside GC] (29-2338, 29-2401)
Well 14 (29-4226)
Well 33 (29-4223)
Well 44 (TR 5452)
Portneuf River
Michaud
Pocatello
Figure 5-1
Location Map
City of Pocatello Wells
Biosolids Program Wells (Water Right No.)
Interconnected City Municipal Wells (Water Right No.)
Interconnected Airport Wells (Water Right No.)
Other Wells (Water Right No.)
Eastern Snake Plain Aquifer Boundary
Lower Portneuf River Valley Aquifer Boundary
Feet
2,500 0 2,500 5,000
Copyright © 2013 National Geographic Society, i-cubed

Figure 5-2

Summary of Transient Response of Curren Spring to Pocatello ESPA Wells

Eastern Snake Plain Aquifer Model Version 2.1

Annual Impact on Curren Spring as % Annual Pocatello Well Pumping



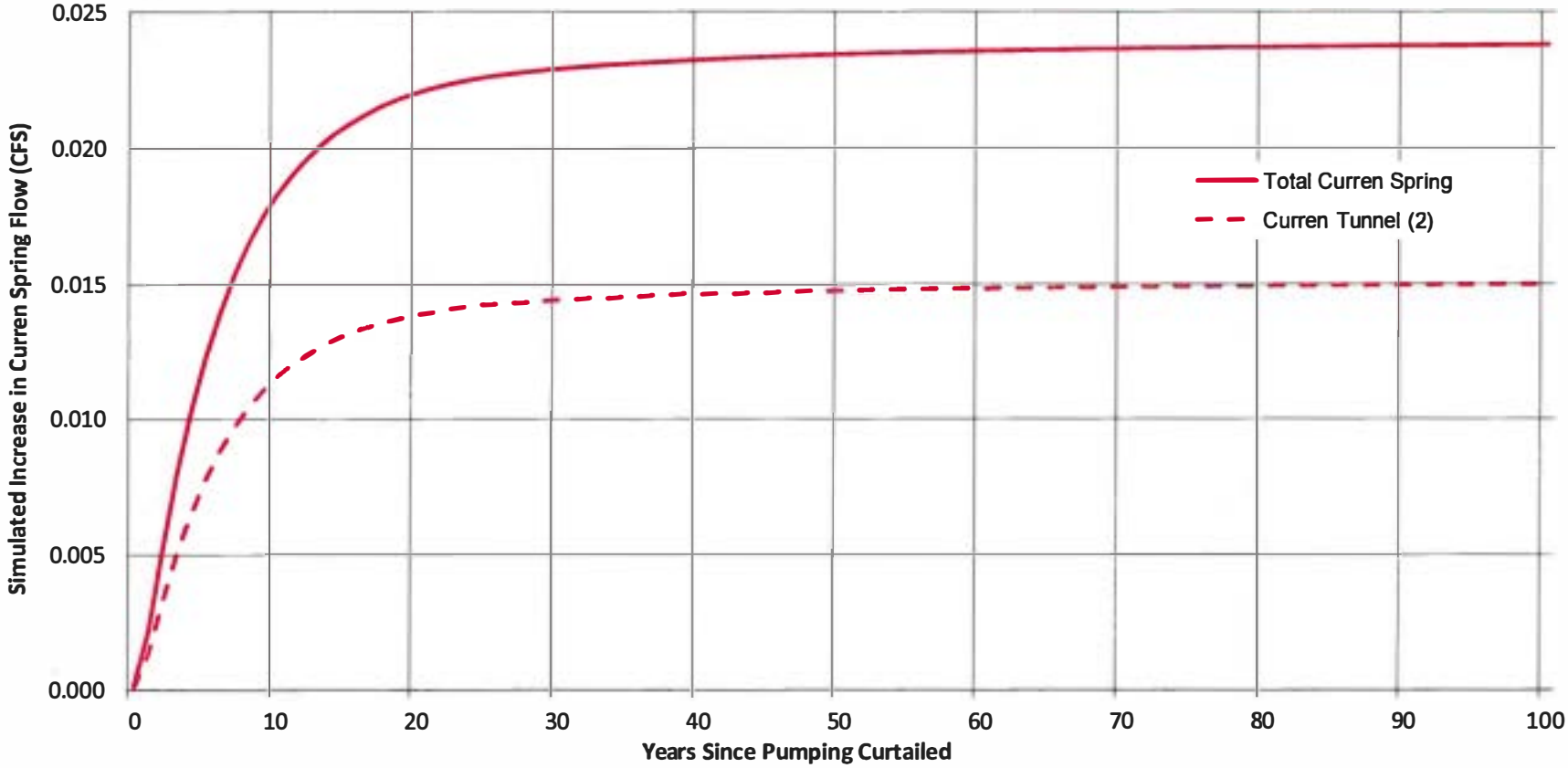
Note: (1) Impact to Curren Tunnel equal to 63% of total impact to the Curren Spring based on the Curren Tunnel vs. Total Curren Spring regression.

Figure 5-3

Summary of Transient Response of Curren Spring to Curtailment of Pocatello's ESPA Wells [1] with Priority Dates Junior to July 1, 1957

Eastern Snake Plain Aquifer Model Version 2.1

Increase in Curren Spring Flow (CFS)



Notes: (1) The response from curtailment assumes that the impact of Pocatello's current level of pumping had reached steady state prior to curtailment. In actuality, Pocatello's current level of pumping has not reached steady-state and therefore, the transient response to curtailment would be less than the amounts shown.
(2) Impact to Curren Tunnel only equal to 63% of total impact to the Curren Spring based on the Curren Tunnel vs. Total Curren Spring regression.

Spronk Water Engineers, Inc.

Updated 1/26/2015

Tables

Table 3-1

Summary of Rangen Hatchery Water Rights

Water Right No.	36-00134B	36-00135A	36-15501	36-02551	36-07694
Source:	Martin-Curren Tunnel	Martin-Curren Tunnel	Martin-Curren Tunnel	Martin-Curren Tunnel	Martin-Curren Tunnel
Priority Date:	October 9, 1884	April 1, 1908	July 1, 1957	July 13, 1962	April 12, 1977
Beneficial Use:	Irrigation (0.09 cfs) and Domestic (0.07 cfs)	Irrigation (0.05 cfs) and Domestic (0.05 cfs)	Fish Propagation	Domestic (0.10 cfs) and Fish Propagation (48.54)	Fish Propagation
Diversion Rate (cfs):	0.09	0.05	1.46	48.54	26.00
Period of Use:	Jan. 1 - Dec. 31 (Domestic) Feb. 15 - Nov 30 (Irrigation)	Jan. 1 - Dec. 31 (Domestic) Feb. 15 - Nov 30 (Irrigation)	Jan. 1 - Dec. 31	Jan. 1 - Dec. 31	Jan. 1 - Dec. 31

Other Curren Tunnel Water Rights

Water Right No.	Owner	Diversion Rate (cfs)	Priority Date	Beneficial Use
36-134A	Margaret Candy	0.49	10/09/1884	Domestic and Irrigation
36-134D	Howard Morris	1.58	10/09/1884	Irrigation and Stockwater
36-134E	Howard Morris	0.82	10/09/1884	Irrigation and Stockwater
36-102	Alvin Musser	4.10	4/01/1892	Domestic, Irrigation and Stockwater
36-135B	Margaret Candy	0.51	04/01/1908	Irrigation
36-135D	Howard Morris	1.58	04/01/1908	Irrigation and Stockwater
36-135E	Howard Morris	0.82	04/01/1908	Irrigation and Stockwater
36-10141A	Howard Morris	0.82	12/01/1908	Irrigation and Stockwater
36-10141B	Howard Morris	0.43	12/01/1908	Irrigation and Stockwater
	Total	**11.15**		

Note: Source of above water rights is the "Martin-Curren Tunnel" which is also known as "Curren Tunnel".

Table 3-2

Summary of Monthly Decreed Curren Tunnel Water Rights
Senior to Rangen's 1957 Priority Water Right
(CFS)

		Rangen		Candy		(1)	Musser	Morris						(2)
	Month	Rangen 36-134B (10/9/1884)	Rangen 36-135A (4/1/1908)	Candy 36-134A (10/9/1884)	Candy 36-135B (4/1/1908)	Total Senior Water Rights Diverted from Curren Tunnel	Musser 36-102 (4/1/1892)	Morris 36-134D (10/9/1884)	Morris 36-134E (10/9/1884)	Morris 36-135D (4/1/1908)	Morris 36-135E (4/1/1908)	Morris 36-10141A (12/1/1908)	Morris 36-10141B (12/1/1908)	Total Morris Irrigation Water Rights
	Jan	0.07	0.05	0.04	-	0.16	0.11	0.06	0.04	0.03	0.02	0.03	0.02	-
(3)	Feb	0.08	0.05	0.29	0.26	0.17	2.16	0.85	0.45	0.82	0.43	0.44	0.24	3.03
	Mar	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Apr	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	May	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Jun	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Jul	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Aug	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Sep	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Oct	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Nov	0.09	0.05	0.49	0.51	0.18	4.10	1.58	0.82	1.58	0.82	0.82	0.43	6.05
	Dec	0.07	0.05	0.04	-	0.16	0.11	0.06	0.04	0.03	0.02	0.03	0.02	-
	Ann Avg	0.09	0.05	0.40	0.40	0.18	3.27	1.27	0.66	1.26	0.65	0.66	0.35	4.79

Notes: (1) Sum of the portions of the senior water rights that are reportedly still diverted at the Curren Tunnel including Candy 36-134A (0.04 cfs), Rangen 36-134B (0.09 cfs during the irrigation season 2/15 - 11/30 and 0.07 cfs during the non-irrigation season), and Rangen 36-135A (0.05 cfs).

(2) Sum of the irrigation portion of the Morris water rights which include 36-134D (1.58 cfs), 36-134E (0.82 cfs), 36-135D (1.58 cfs), 36-135E (0.82 cfs), 36-10141A (0.82 cfs), and 36-10141B (0.43 cfs) decreed for a period of use of 2/15 - 11/30.

(3) Because the irrigation season for the Curren Tunnel water rights begins February 15, the monthly rates in February are computed as 50 percent of the rate of the irrigation water right plus rates of domestic and/or stock water rights.

Source: Partial decrees for all water rights with Curren Tunnel water source.

Table 3-3

IDWR Curren Tunnel Flow Records
September 8, 1993 - 2014
Monthly Average Flows
(CFS)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993									11.16	15.35	16.38	13.49
1994	11.59	10.15	8.72	6.22	6.94	6.74	5.56	7.96	12.59	16.60	15.65	12.74
1995	10.82	9.27	8.39	6.65	5.77	7.07	6.63	7.63	11.72	15.94	16.59	14.95
1996	13.66	12.24	11.41	10.21	9.01	9.85	8.42	11.42	15.84	19.48	20.08	18.77
1997	17.46	16.42	15.99	15.15	13.63	3.29	0.53	1.68	10.05	23.12	6.40	0.75
1998	0.64	0.00	0.61	0.60	0.57	2.26	1.78	11.38	16.78	17.55	19.06	19.10
1999	18.15	16.85	15.45	14.29	12.82	13.31	12.04	13.14	17.57	21.82	22.32	20.36
2000	18.76	17.30	15.84	13.22	12.27	11.19	10.14	12.07	16.69	20.21	20.32	18.13
2001	15.77	14.20	12.24	9.45	7.08	6.14	5.76	6.67	9.07	11.83	12.98	11.65
2002	8.83	6.90	5.99	5.12	3.50	2.57	2.30	2.33	5.22	10.48	9.97	8.04
2003	6.52	5.11	4.63	3.22	2.63	2.35	1.84	3.10	5.98	9.74	9.03	7.55
2004	6.73	5.84	5.03	3.55	3.53	4.07	3.51	3.84	5.74	5.06	3.83	3.12
2005	2.64	2.18	2.12	2.04	1.96	1.50	0.78	1.16	3.01	6.30	5.71	4.53
2006	3.45	3.36	2.95	2.87	3.12	4.43	5.56	5.02	7.68	10.24	9.94	7.85
2007	5.12	4.70	3.69	2.53	2.65	3.55	3.00	2.74	7.76	11.90	10.76	9.01
2008	7.22	6.49	4.29	2.68	1.65	2.57	1.90	2.05	3.26	8.11	7.64	4.28
2009	3.33	2.93	2.05	1.08	1.17	1.57	1.83	1.35	3.72	8.74	6.72	5.54
2010	3.95	3.81	2.59	1.46	1.61	2.99	1.98	0.85	1.73	5.66	6.10	4.12
2011	3.07	2.85	2.64	2.59	2.82	2.45	1.93	2.00	4.25	8.14	9.35	6.82
2012	4.97	4.71	3.79	2.60	2.52	3.96	3.29	2.69	4.83	9.15	9.55	8.18
2013	5.79	4.45	3.37	1.98	1.22	1.53	1.38	1.42	4.09	7.43	5.75	3.45
2014	2.50	2.33	2.17	1.16	1.06	1.34	0.93	2.03	3.90	5.99	5.38	4.12
Ann Avg	8.14	7.24	6.38	5.17	4.64	4.51	3.86	4.88	8.30	12.22	11.34	9.39
Max	18.76	17.30	15.99	15.15	13.63	13.31	12.04	13.14	17.57	23.12	22.32	20.36
Min	0.64	0.00	0.61	0.60	0.57	1.34	0.53	0.85	1.73	5.06	3.83	0.75

Source: Data provided by IDWR in a spreadsheet "MCT thru 2015_0106.xlsx" on January 6, 2015.

Table 3-4

Rangen 6-Inch White Pipe Records
1996 - 2014
Monthly Average Flows
(CFS)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	0.63	0.68	0.69	0.71	0.95	0.72	0.95	0.92	0.81	0.82	0.47	0.88
1997	0.87	0.69	0.71	0.77	0.86	0.91	0.96	0.94	0.90	0.99	0.96	0.82
1998	0.93	0.93	0.92	1.07	1.25	1.28	1.19	1.16	1.05	0.62	0.06	0.04
1999	0.05	0.10	0.15	0.32	0.63	0.89	0.76	1.18	0.74	0.52	0.59	0.74
2000	0.56	0.60	0.69	0.89	0.70	0.71	0.95	1.00	0.78	0.57	0.36	0.38
2001	0.33	0.28	0.30	0.63	0.73	0.95	1.00	0.13	0.36	0.06	0.15	0.49
2002	0.56	0.78	0.87	0.64	0.64	0.65	0.49	0.74	0.67	0.37	0.95	0.91
2003	0.88	1.09	0.59	0.23	0.30	0.24	0.22	0.22	0.35	0.09	0.17	0.24
2004	0.10	0.10	0.31	0.62	0.21	0.22	0.20	0.23	0.32	0.17	0.26	0.15
2005	0.32	0.11	0.29	0.18	0.30	0.18	0.28	0.21	0.25	0.17	0.30	0.19
2006	0.47	0.15	0.28	0.36	0.19	0.23	0.21	0.23	0.31	0.71	0.25	0.36
2007	0.67	0.08	0.06	0.40	0.66	0.19	0.24	0.64	0.47	0.05	0.05	0.39
2008	0.68	0.07	0.18	0.70	0.53	0.05	0.14	0.61	1.03	0.83	0.09	0.58
2009	0.51	0.05	0.20	0.64	0.48	0.05	0.05	0.33	0.71	0.38	0.10	0.51
2010	0.62	0.05	0.23	0.66	0.17	0.05	0.05	0.38	0.62	0.19	0.11	0.35
2011	0.44	0.09	0.12	0.54	0.46	0.05	0.05	0.26	0.64	0.32	0.10	0.38
2012	0.47	0.07	0.16	0.61	0.43	0.05	0.05	0.23	0.56	0.44	0.09	0.39
2013	0.37	0.04	0.10	0.58	0.53	0.04	0.04	0.23	0.60	0.43	0.12	0.38
2014	0.40	0.04	0.07	0.57	0.35	0.04	0.04	0.26	0.59	0.37	0.04	0.14
Ann Avg	0.52	0.32	0.36	0.59	0.55	0.40	0.41	0.52	0.62	0.43	0.27	0.44
Max	0.93	1.09	0.92	1.07	1.25	1.28	1.19	1.18	1.05	0.99	0.96	0.91
Min	0.05	0.04	0.06	0.18	0.17	0.04	0.04	0.13	0.25	0.05	0.04	0.04

Source: Data from 1996 - 2013 downloaded from IDWR website. Data for 2014 provided by Rangen on January 23, 2015.

Table 3-5

Total Curren Tunnel Flows
1996 - 2014
Monthly Average Flows
(CFS)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	14.29	12.92	12.09	10.92	9.95	10.57	9.38	12.33	16.65	20.30	20.55	19.65
1997	18.33	17.10	16.70	15.92	14.49	4.19	1.49	2.62	10.96	24.11	7.36	1.57
1998	1.57	0.93	1.53	1.67	1.82	3.54	2.97	12.54	17.83	18.17	19.12	19.14
1999	18.19	16.95	15.59	14.61	13.45	14.20	12.79	14.31	18.31	22.34	22.92	21.09
2000	19.32	17.90	16.53	14.11	12.97	11.90	11.09	13.08	17.47	20.78	20.68	18.51
2001	16.10	14.48	12.54	10.08	7.81	7.09	6.76	6.80	9.42	11.89	13.13	12.14
2002	9.39	7.68	6.87	5.76	4.14	3.22	2.79	3.07	5.89	10.84	10.92	8.95
2003	7.39	6.20	5.23	3.45	2.93	2.59	2.06	3.32	6.33	9.84	9.20	7.79
2004	6.83	5.94	5.33	4.17	3.74	4.29	3.70	4.07	6.06	5.22	4.10	3.26
2005	2.96	2.29	2.41	2.22	2.26	1.69	1.06	1.37	3.26	6.47	6.01	4.73
2006	3.92	3.51	3.22	3.23	3.31	4.66	5.77	5.24	7.99	10.95	10.19	8.21
2007	5.79	4.79	3.75	2.93	3.31	3.74	3.25	3.38	8.23	11.95	10.81	9.40
2008	7.90	6.55	4.47	3.38	2.18	2.62	2.05	2.66	4.29	8.94	7.73	4.86
2009	3.84	2.98	2.25	1.72	1.64	1.62	1.88	1.68	4.43	9.12	6.82	6.04
2010	4.57	3.86	2.82	2.11	1.78	3.04	2.03	1.23	2.35	5.85	6.21	4.47
2011	3.51	2.94	2.76	3.14	3.27	2.50	1.98	2.26	4.89	8.46	9.45	7.20
2012	5.43	4.78	3.95	3.21	2.95	4.01	3.34	2.92	5.40	9.59	9.65	8.56
2013	6.16	4.49	3.47	2.57	1.75	1.57	1.42	1.65	4.69	7.86	5.87	3.83
2014	2.90	2.37	2.24	1.74	1.41	1.38	0.97	2.29	4.49	6.36	5.42	4.26
Ann Avg	8.34	7.30	6.51	5.63	5.01	4.65	4.04	5.10	8.36	12.05	10.85	9.14
Max	19.32	17.90	16.70	15.92	14.49	14.20	12.79	14.31	18.31	24.11	22.92	21.09
Min	1.57	0.93	1.53	1.67	1.41	1.38	0.97	1.23	2.35	5.22	4.10	1.57

Notes: Total Curren Tunnel flow is equal to IDWR Curren Tunnel flows (Table 3-3) plus the Rangen 6-inch White Pipe flows (Table 3-4).

Table 4-1

Summary of Available Curren Tunnel Flows and Allocation of Flows to Senior Water Rights Morris Exchange Credit Calculations, and Water Available to Rangen's 1957 Priority Water Right

(CFS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Available Flows			Morris Exchange Credit		Rangen's 1957 Water Right					Morris Exchange Credit Available to Rangen's 1962 Water Right
Month	Avg Monthly Total Curren Tunnel Flow 2014	Total Senior Water Rights Diverted from Curren Tunnel	Total Curren Tunnel Water Available 2014	Decreed Morris Irrigation Water Rights	Morris Exchange Credit Available 2014	Rangen 36-15501 (7/1/1957)	Morris Exchange Credit to Rangen's 1957 Water Right	Other Curren Tunnel Flow to Rangen's 1957 Water Right	Total Flow to Rangen's 1957 Water Right	Shortage (-) to 1957 Water Right	
Jan	2.89	0.16	2.73	-	-	1.46	-	1.46	1.46	-	-
Feb	2.39	0.17	2.22	3.03	2.22	1.46	1.46	-	1.46	-	0.76
Mar	2.22	0.18	2.04	6.05	2.04	1.46	1.46	-	1.46	-	0.58
Apr	1.70	0.18	1.52	6.05	1.52	1.46	1.46	-	1.46	-	0.06
May	1.42	0.18	1.24	6.05	1.24	1.46	1.24	-	1.24	(0.22)	-
Jun	1.39	0.18	1.21	6.05	1.21	1.46	1.21	-	1.21	(0.25)	-
Jul	0.94	0.18	0.76	6.05	0.76	1.46	0.76	-	0.76	(0.70)	-
Aug	2.36	0.18	2.18	6.05	2.18	1.46	1.46	-	1.46	-	0.72
Sep	4.56	0.18	4.38	6.05	4.38	1.46	1.46	-	1.46	-	2.92
Oct	6.39	0.18	6.21	6.05	6.05	1.46	1.46	-	1.46	-	4.59
Nov	5.38	0.18	5.20	6.05	5.20	1.46	1.46	-	1.46	-	3.74
Dec	4.21	0.16	4.05	-	-	1.46	-	1.46	1.46	-	-
Ann Avg	2.99	0.18	2.81	4.79	2.23	1.46	1.12	0.24	1.36	(0.10)	1.11

Notes:

(1) Total Curren Tunnel flows (IDWR measurements plus 6-inch White Pipe) reported in 2014.

(2) Sum of the portions of the senior water rights that are reportedly still diverted at the Curren Tunnel including Candy 36-134A (0.04 cfs), Rangen 36-134B (0.09 cfs during the irrigation season 2/15 - 11/30 and 0.07 cfs during the non-irrigation season), and Rangen 36-135A (0.05 cfs).

(3) = (1) - (2).

(4) Sum of the irrigation portion of the Morris water rights which include 36-134D (1.58 cfs), 36-134E (0.82 cfs), 36-135D (1.58 cfs), 36-135E (0.82 cfs), 36-10141A (0.82 cfs), and 36-10141B (0.43 cfs) decreed for a period of use of 2/15 - 11/30.

(5) Minimum of Morris decreed water rights (4) and available Curren Tunnel flow (3).

(6) Rangen's decreed 1957 priority water right for fish propagation.

(7) Minimum of Morris Exchange Credit available (5) and Rangen's 1957 priority water right (6).

(8) Minimum of available Curren Tunnel flow (3) and Rangen's 1957 priority water right (6) less Morris Exchange Credit to Rangen's 1957 priority water right (7).

(9) = (7) + (8).

(10) = (9) - (6).

(11) = (5) - (7).

Table 4-2

Summary of Mitigation Requirement and Mitigation Supplies to Rangen
Excluding Recharge and Aquifer Enhancement Activities
Transient - 2015
(CFS)

	Month	(1) Shortage to 1957 Water Right	(2) Mitigation Requirement to Rangen's 1962 Water Right	(3) Total Estimated Mitigation Requirement	(4) Morris Exchange Credit: Morris Exchange Credit Available to Rangen's 1962 Water Right	(5) Morris Exchange Credit: Shortage (-) / Surplus(+) after Morris Credit	(6) Magic Springs Project: Magic Springs Pipeline	(7) Magic Springs Project: Shortage (-) / Surplus(+) after Magic Springs	(8) Bridge Diversion (2014)
Year 1	Jan	-	3.99	3.99	-	(3.99)	-	(3.99)	10.25
	Feb	-	3.99	3.99	0.76	(3.23)	10.00	6.77	10.40
	Mar	-	3.99	3.99	0.58	(3.41)	10.00	6.59	8.96
Year 2	Apr	-	6.10	6.10	0.06	(6.04)	10.00	3.96	9.52
	May	0.22	6.10	6.32	-	(6.32)	10.00	3.68	9.89
	Jun	0.25	6.10	6.35	-	(6.35)	10.00	3.65	9.58
	Jul	0.70	6.10	6.80	-	(6.80)	10.00	3.20	9.62
	Aug	-	6.10	6.10	0.72	(5.38)	10.00	4.62	8.57
	Sep	-	6.10	6.10	2.92	(3.18)	10.00	6.82	8.77
	Oct	-	6.10	6.10	4.59	(1.51)	10.00	8.49	9.47
	Nov	-	6.10	6.10	3.74	(2.36)	10.00	7.64	9.89
	Dec	-	6.10	6.10	-	(6.10)	10.00	3.90	9.60
	Ann Avg	-	5.57	5.67	1.11	(4.56)	9.17	4.61	9.54

Notes: (1) Shortage to Rangen's decreed 1957 priority water right in 2014 after Morris Exchange Credit (see Table 1).

(2) Estimated Predicted accrual to the Curren Tunnel after curtailment of the total ESPA area of common ground water junior to 1962; Year 1 through March 31, 2015 (3.4 cfs * (16.9 cfs/14.4 cfs)) and Year 2 starting April 1, 2015 (5.2 cfs * (16.9 cfs/14.4 cfs)).

(3) = (1) + (2).

(4) Morris credit available after allocation to 1957 water right (see Table 4-1 col. 11).

(5) = (4) - (3).

(6) Rate of flow for Magic Springs Pipeline (10 cfs).

(7) = (5) + (6).

(8) Total Rangen Hatchery flows (2014) less total Curren Tunnel flows (2014). Total Hatchery flows in 2014 provided by Rangen. These are estimated amounts that would be available if and when IGWA complies with the requirements of the 11/18/2014 IDWR Order.

Source: Maximum diversion rates and period of use taken from partial decrees; Curren Tunnel and Rangen flows from IDWR and Rangen. IGWA's Mitigation Plans (1 - 5) and Orders.

Table 5-1

Summary of Water Rights
City of Pocatello

Water Right	Water Rights			Historical Well No. or Source	AKA/Name	Aquifer
	Priority Date (1)	Diversion Rate (cfs)	Cum Rate (cfs)			
SURFACE WATER RIGHTS						
29-271	2/26/1869	3.22	3.22	Mink Creek		N/A
29-4222	6/16/1898	5.00	8.22	Gibson Jack Creek		N/A
29-272	10/1/1901	0.56	8.78	Mink Creek		N/A
29-273	10/1/1917	1.218	10.00	Mink Creek		N/A
CITY INTERCONNECTED WELLS AND WATER RIGHTS						
29-13558	7/16/1924	1.34	1.34	Alameda 1		LPRVA
29-13559	12/31/1925	0.96	2.30	Alameda 2		LPRVA
29-13560	12/31/1926	9.13	11.43	1(5)		LPRVA
			11.43	2 (2.45 cfs)		LPRVA
			11.43	3 (4.23 cfs)		LPRVA
29-13561	8/31/1931	4.23	15.66	4		LPRVA
29-13562	12/31/1936	2.45	18.11	6		LPRVA
29-13637	12/31/1940	4.46	22.57	7		LPRVA
29-4221	6/1/1943	2.67	25.24	26	PIP	LPRVA
29-2274	6/15/1948	9.69	34.93	8		LPRVA
			34.93	9		LPRVA
			34.93	10		LPRVA
Tr 5452			34.93	44		LPRVA
29-11348	8/31/1951	4.90	39.83	28	20/Turner	LPRVA
29-13639	10/21/1952	3.68	43.51	22	Alameda 3	LPRVA
29-2338	9/1/1953	9.53	53.04	12		LPRVA
			53.04	13	17	LPRVA
			53.04	15		LPRVA
29-4224	9/15/1955	3.89	56.93	21	Alameda 4	LPRVA
29-4226	12/31/1955	0.22	57.15	14	Cree	LPRVA
29-4225	8/15/1956	4.44	61.59	23	Alameda 5	LPRVA
29-2401	10/16/1958	12.22	73.81	13	17	LPRVA
			73.81	16		LPRVA
			73.81	18		LPRVA
29-11339	12/31/1961	3.36	77.17	Alameda 6		LPRVA
			77.17	Alameda 7		LPRVA
29-4223	10/1/1962	0.21	77.38	33	Call	LPRVA
29-2499	12/10/1964	4.10	81.48	27		LPRVA
29-7106	11/6/1972	3.90	85.38	29		LPRVA
29-7322	4/25/1976	17.06	102.44	30 (5.58 cfs)		LPRVA
			102.44	31(8.03 cfs)		LPRVA
			102.44	32 (3.46 cfs)		ESPA
29-7375	2/24/1977	2.23	104.67	15		LPRVA
29-7782	1/18/1985	7.00	111.67	34		LPRVA
29-8086	3/26/1992	4.00	115.67	36		LPRVA

Table 5-1

Summary of Water Rights
City of Pocatello

Water Right	Water Rights			Historical Well No. or Source	AKA/Name	Aquifer
	Priority Date (1)	Diversion Rate (cfs)	Cum Rate (cfs)			
AIRPORT INTERCONNECTED WELLS AND WATER RIGHTS						
29-13638	12/31/1940	2.20		39	Phillips 1	ESPA
29-74S0	6/13/1978	3.34		35	Phillips 3	ESPA
BIOSOLIDS PROGRAM WATER RIGHTS						
29-2255D	5/22/1939	0.482		2	A0007741	ESPA
29-4276	4/1/1940	0.27		Douglas Spr	Spring	N/A
29-11344	12/31/1942	1.92		40	Phillips 2 Fortress A0007550	ESPA
29-2259	6/20/1944	2.60		Pit Road	Swanson A0007773	ESPA
29-2255F	9/16/1949	0.40		2	A0007741	ESPA
29-2344A	12/31/1953	1.18		DP 140		ESPA
29-7073	9/30/1971	1.49		3	A0008708	ESPA
29-7118	4/11/1973	4.01		42	Airport 1 South Smith A0007545	ESPA
29-7119	4/11/1973	6.00		41	Airport 2 North Smith 007547	ESPA
29-7770	5/21/1984	4.46		WPC	City Pivot A0007549	ESPA
OTHER WATER RIGHTS						
29-2354	8/27/1954	0.28		Restlawn Cemetery		LPRVA
29-2382	12/21/1956	3.82		17	Highland GC	LPRVA
29-13636	10/16/1958	0.80		19		ESPA
29-7502	7/6/1979	0.10		Restlawn Cemetery		LPRVA
29-7222	8/22/1974	1.00		43	Ward Park	ESPA
29-7431	12/29/1977	9.28		Wastewater		N/A
STORAGE RIGHTS						
01-2068	7/28/1939	50,000 AF		Palisades Reservoir		N/A

TOTALS FOR GROUND WATER RIGHTS	Diversion Rate (cfs)
Total	149.75
Total in ESPA Aquifer	33.34
Total in LPRVA Aquifer	116.41
Total junior to July 1, 1957	75.28
Total junior to July 1, 1957 in ESPA Aquifer	24.56
Total junior to July 1, 1957 in LRPVA Aquifer	50.72